



Amoco Oil Company

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November 12, 1984

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Mr. Lawrence W. Eastep, P.E.
Manager, Permit Section
Division of Land Pollution Control
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

RECEIVED

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ILL. E.P.A. - D.L.P.C.
STATE OF ILLINOIS

Dear Sir:

Reference 119115001--Madison County Wood River/Amoco Refinery ILD 980700967

This letter is in response to your October 12, 1984 letter rejecting our closure plan for hazardous waste management facilities located within our main plant site in Wood River, ILD 980700967.

Following are answers to your specific questions which we believe are designed to correct the deficiencies in our plan:

1. What type of foundation exists for the 9,000-gallon "Spent Doctor Solution Storage Tank" (SO2)? No method for determining contamination or removing contamination of the foundation was described.

This is an elevated, vertical tank that sits on steel supports or legs above a concrete pad. There is no visible sign of contamination at present. Contamination would be indicated by a reddish discoloration of the pad (spent doctor solution has an intense red color) or by encrustations of solids remaining from the evaporation of the solution. If either solids or discoloration are detected at closure, scrapings will be taken and analyzed for extractable lead by the USEPA extraction procedure. If this material is shown to be hazardous by this test, the pad will be scraped clean, and the scrapings will be disposed of as a hazardous waste.

2. Detailed specifications and procedures for treatment of wastes from the "South Flare Pit" must be provided. Which hazardous constituents are rendered non-hazardous, immobile, inert, etc.? How does the chemical fixation process work? What chemical reactions take place, and what is the final form of the waste?

The prime purpose of this treatment is to eliminate free liquids so the material can be disposed of in a landfill. If the process binds up or deactivates reactive sulfide, the stabilized material can be placed in an industrial landfill rather than a hazardous waste landfill.

Kim
M/M
M/E

Following is a discussion of the Chemfix® process provided us by Chemfix Technologies, Inc.:

- . The Chemfix Technologies, Inc. treatment process is similar to cement based technique. The Chemfix process utilizes a two-part, inorganic chemical system which reacts with polyvalent metal ions and with certain other waste components; it also reacts within itself to form a chemically and mechanically stable solid. This system is based on the reactions between soluble silicates and silicate setting agents, which react in a controlled manner to produce a solid matrix. The matrix itself, as produced, is actually a pseudomineral which displays physical properties of high stability, high melting point, and a rigid, friable structure. This is similar to many cohesive soils.

Three classes of reactions can occur. First are the very rapid reactions between soluble silicates and polyvalent metal ions, producing insoluble metal silicates. These insoluble compounds are nontoxic and cannot easily be resolubilized. In some cases, they are similar to the minerals from which the metals were originally extracted and are quite resistant to breakdown.

The second class of reactions occurs between the soluble silicate and reactive components of the setting agent. The setting agent is formulated or chosen so that it has limited solubility of the cross-linked ions, but a high reserve capacity of such ions so that the reactions can take place slowly under controlled conditions. The gel structure formed is suitable to producing good solid properties, especially in waste which has a high water content. The gel structure has the property of being able to hold very large quantities of water while acting in all respects like a solid. The gel reaction occurs quickly enough to prevent the settling out of solids. Other waste components, such as soils and organics, are also entrapped in the structure and thereby immobilized.

The third class of reactions (depending upon the setting agent used) occurs between the setting agent and the waste and/or water, as it undergoes a series of hydrolysis, hydration, and neutralization reactions.

3. How was the quantity of contaminated soil below the "South Flare Pit" (140 cubic yards) determined? What chemical analyses were performed? What concentration of which hazardous constituent becomes "uncontaminated?" Composite samples shall be taken to at least a depth of two feet, greater if evidence of contamination is present to this depth.

The determination of the amount of contaminated soil below the south flare was a simple estimate. We assumed a 2' depth of

contaminated soil under the entire 25' x 75' pit. No samples of soil were obtained, and no chemical analyses were performed. However, samples were taken of the sludge in the pit and were analyzed for sulfide and EP toxicity metals. The results of these tests are shown in attached Table I. In probing the sludge to obtain these samples, we were able to make an estimate that the sludge was two feet deep. Even though this was based on measurement, we consider it to be an estimate, and that it means that we are reasonably sure the average sludge depth is closer to 2' than it is to 1' or 3'.

Sulfide is the constituent we are concerned with. We will consider the soil uncontaminated when the reactive sulfide content is less than 100 ppm. We propose to remove all contaminated soil.

4. Documentation was not provided to show that the water in the "South Flare Pit" can be treated at the refinery waste water treatment plant.

The water in this pit is primarily rainwater with the properties shown in Table II. The EP Toxicity metals concentrations approach drinking water standards. The volume of water in the pit is in the range of 50 to 60,000 gallons. This amounts to only about 2 percent of the normal daily flow to the waste water plant which was designed to treat 6.4 MGD of a waste having a chemical oxygen demand (COD) of 674 ppm or 36,000 pounds/day. If the water in the pit had a COD concentration of 10,000 ppm, this would amount to only 5,000 pounds/day of COD. The wastewater plant has a total aeration capacity of 600 HP, capable of providing about 43,000 pounds/day of oxygen transfer. We propose to trickle the water from the pit to the plant sewers at a rate designed to avoid any overload of oxygen transfer capability.

5. Quality control was not addressed for the solidification process. What compounds are present in the waste or soil from the "South Flare Pit" that may interfere with the process? What settling/curing time is required?

Prior to beginning the project, Chemfix will develop optimum ratios for the range of raw waste solids percentages to be encountered during processing. During processing, solids will be monitored periodically with any necessary ratio adjustments being made accordingly.

Liquid reagent flow will be metered and controlled to the proper rate versus the flow rate of raw sludge. Dry reagent addition will be calibrated prior to the project to insure proper addition over the complete range of raw sludge processing rates. These addition methods fall within tolerance limits necessary to insure satisfactory solidification.

Chemfix® product samples will be collected once every three hours of production time or from each batch prior to allowing them to solidify. The samples will be obtained at the end of the discharge hose. A portion of each sample will be retained for archival storage. EP Toxicity and reactive sulfide content will be run on the other portion.

Free liquids will be determined by the paint filter test.

We are not aware of any compounds present in the sludge or soil that would interfere with the solidification process. The Chemfix process has been shown to be effective on oily wastes from the wastewater surge ponds on our riverfront property, producing a soil-like product. The sludge from this pit is a similar material insofar as it consists of oily solids. The purpose of the solidification process is to eliminate free liquid. Deactivation of the sulfide would be a bonus. Curing time is normally 24 to 48 hours.

6. For the "spray pond," what tests were performed to indicate that only 1.8 acres of the 33 acres has significant concentration of sulfides in the sediments?

Following the suspension of petroleum refining operations in 1981, Amoco Chemicals Corporation assumed operation of the plant site and retained Dames and Moore to determine the nature of the sediment in the spray pond. The Dames and Moore study showed negligible sulfide concentrations in the sediment. Amoco Oil believed, however, that the area with the greatest potential for high sulfides was the area where the sour condensate was introduced for treatment. Accordingly, a single composite made up of several grabs was taken in this area in April, 1983. The sulfide content was 9,100 ppm.

Based on the fact that the recycle cooling water in the spray pond contained dissolved oxygen, and on our observation of what appeared to be elemental sulfur precipitating in the area of the sour condensate inlet, we judged that sediment contaminated with sulfide probably did not extend beyond the 1.8 acre area in the northwest corner of the spray pond.

We are fully aware that at closure, all contaminated sediment must be removed and that a more precise definition of the contaminated area will have to be made. Accordingly, we have engaged Chemfix® Technologies, Inc. to sample the north section (inlet) of the pond on a grid of 50' centers and to test for sulfide. The grid plan is shown in attached Figure 1.

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7. How were the quantities determined for sludge and contaminated soil in the spray pond?

Based on the Dames and Moore work, sediment was estimated to be 3' deep over the 1.8 acre area judged to be contaminated. It was assumed that one foot of soil under that area would contain high sulfide concentrations.

8. The financial test must be amended to show the amended cost of closure, if any.

Our understanding of the regulations is that the closure cost can be amended at any time, but that financial assurance is to be updated annually within 90 days after the close of the fiscal year. For Standard Oil Company (Indiana) this would be by March 31, or by March 30 in leap years.

We hope we have answered your concerns satisfactorily. If you have further questions or require further information, please advise me or else contact E. J. Sullivan at 312/856-5858.

Yours truly,



John G. Huddle
Director, Environmental Control and Planning
Mail Code 1203

EJS/dk

Attachments

Kenneth G. Mensing, IEPA, Collinsville

TABLE I

Analysis of Sediment From Pit Near the South Refinery Flare (South Flare Pit)

<u>Sample Location</u>	<u>EP Toxicity Leachate Concentrations, ppm</u>								<u>Sulfide</u>
	<u>Pb</u>	<u>Cd</u>	<u>Cr</u>	<u>Ba</u>	<u>As</u>	<u>Se</u>	<u>Ag</u>	<u>Hg</u>	
SW Corner	ND	0.03	0.068	0.13	0.20	ND	ND	ND	158 ppm
West Side	ND	0.04	0.039	0.10	0.11	ND	0.04	ND	250 ppm
North End	ND	0.02	0.080	0.05	0.15	ND	0.17	0.006	75 ppm
East Side	ND	0.01	0.034	0.12	0.11	ND	ND	ND	7 ppm
Det. Limit	0.1	0.01	0.015	0.01	0.02	0.17	0.02	0.0002	- -

TABLE II

Composite Water Samples From Pit Near South Flare (South Flare Pit)

	<u>EP Toxicity Metals Concentrations, mg/l</u>									<u>Sulfide, mg/l</u>
	<u>pH</u>	<u>Pb</u>	<u>Cd</u>	<u>Cr</u>	<u>Ba</u>	<u>As</u>	<u>Se</u>	<u>Ag</u>	<u>Hg</u>	
West Side	9.3	ND	ND	0.047	0.016	0.14	ND	ND	0.004	26
North End	9.2	ND	ND	0.051	0.016	0.16	ND	ND	0.010	27
Det. Limit		0.1	0.01	0.015	0.01	0.05	0.17	0.02	0.0002	1

ND = Not Detected